

$$1. (1) y = 2 - 2x \quad (0 \leq x \leq 2)$$

この関数の値域は $-2 \leq y \leq 2$

$$2x = 2 - y$$

$$x = -\frac{1}{2}y + 1$$

$$\text{よって } \underline{y = -\frac{1}{2}x + 1 \quad (-2 \leq x \leq 2)}$$

$$(2) y = x^2 + 1 \quad (x \geq 0)$$

値域は $y \geq 1$

$$x^2 = y - 1$$

$$x = \pm \sqrt{y-1} \quad x \geq 0 \text{ より } x = \sqrt{y-1}$$

$$\text{よって } \underline{y = \sqrt{x-1}}$$

$$(3) y = \frac{x+1}{x-1}$$

$$xy - y = x + 1$$

$$x(y-1) = y+1$$

$$x = \frac{y+1}{y-1}$$

$$\text{よって } \underline{y = \frac{x+1}{x-1}}$$

$$(4) y = \frac{1}{x+1}$$

$$xy + y = 1$$

$$xy = -y + 1$$

$$x = \frac{-y+1}{y}$$

$$\text{よって } \underline{y = \frac{-x+1}{x}}$$

$$(5) y = 5^x$$

$$x = \log_5 y$$

$$\underline{y = \log_5 x}$$

$$(6) y = \log_2(x-1)$$

$$x-1 = 2^y \rightarrow x = 2^y + 1$$

$$\text{よって } \underline{y = 2^x + 1}$$

2.

$$(1) f(1) = 3 \text{ より } a + b = 3 \dots \textcircled{1}$$

$$f'(5) = 2 \text{ より } f(2) = 5 \Rightarrow 2a + b = 5 \dots \textcircled{2}$$

$$\textcircled{1}, \textcircled{2} \text{ より } \underline{a = 2, b = 1}$$

$$(2) f(-2) = 2 \text{ より } -2a + b = 2 \dots \textcircled{1}$$

$$f'(0) = 4 \text{ より } f(4) = 0 \Rightarrow 4a + b = 0 \dots \textcircled{2}$$

$$\textcircled{1}, \textcircled{2} \text{ より } \underline{a = -\frac{1}{3}, b = \frac{4}{3}}$$

$$\begin{aligned}
 3. \quad (1) \quad (g \circ f)(x) &= (f \circ g)(x) \\
 &= g(f(x)) &= f(g(x)) \\
 &= (3x+2)^2 + 1 &= 3(x^2+1) + 2 \\
 &= 9x^2 + 12x + 5 &= 3x^2 + 5
 \end{aligned}$$

$$\begin{aligned}
 (2) \quad (g \circ f)(x) &= (f \circ g)(x) \\
 &= g(f(x)) &= f(g(x)) \\
 &= \log_4 2^x &= 2^{\log_4 x} \\
 &= x \log_4 2 &= 2^{\frac{1}{2} \log_2 x} \\
 &= \frac{1}{2} x &= \sqrt{x}
 \end{aligned}$$

$2^{\log_4 x} = p$ とおく
 $\log_2 2^{\log_4 x} = \log_2 p$
 $\log_4 x = \log_2 p$
 $\frac{1}{2} \log_2 x = \log_2 p$
 $\log_2 x^{\frac{1}{2}} = \log_2 p$

4. $y = \frac{ax-4}{x+3}$ の逆関数を求める

$$xy + 3y = ax - 4$$

$$x = \frac{-3y-4}{y-a}$$

$$y = \frac{3x+4}{-x+a}$$

これは $y = \frac{3x+4}{bx+2}$ になるので

$$\underline{a=2, \quad b=-1}$$

5. $f(x) = ax + b$ とおく

$$f(3) = -2 \text{ より } 3a + b = -2 \dots \textcircled{1}$$

$f(f(x)) = x$ に $x=3$ を代入して

$$f(f(3)) = 3$$

$$f(-2) = 3 \Rightarrow -2a + b = 3 \dots \textcircled{2}$$

$$\textcircled{1}, \textcircled{2} \text{ より } a = -1, \quad b = 1$$

$$\text{よって } \underline{f(x) = -x + 1}$$